S/129/62/000/010/001/006
E193/E383

AUTHORS: Kuritsyna, A.D., Candidate of Technical Sciences, Rudnitskiy, N.M., Korolev, F.V. and Korsunskaya, K.N., Engineers

TITLE: Influence of the treatment of certain bimetallic materials on the bond strength

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no. 10, 1962, 8 - 11

TEXT: The object of the present investigation was to study the effect of annealing on the strength of bond between the components of various bimetallic strips fabricated by the usual pressure-welding (cold-rolling) method. The following were included in the experimental materials: pure aluminium; alloy AMK (Al-0.5% Si-0.5% Mn); Al-20% Sn alloy: Moren-400 (Al-4% Si); ACC-6-5 (ASS-6-5) alloy (Al-6% Sb-5% Pb-0.5% Mg). In the first series of experiments the Al/Al, Al/Al-20% Sn and Al-20% Sn/AMK bimetal strips were studied, the last of these being fabricated with and without a treatment which entailed tinning of the Al-20% Sn alloy surface with tin squeezed out of the alloy itself.
Card 1/3

Wedge-shaped sandwiches were used in every case so that the reduction in the first rolling-pass varied from 40% at one end of the strip to 80% at the other, a uniform reduction of 36% being given in the second pass. Shear-strength tests were carried out on suitably prepared bimetal specimens, both in the as-rolled condition and after 30 min annealing at 350, 450 and 550 °C. The shear strength of each individual metal given similar treatment was also determined. The results can be summarized as follows: 1) the shear-strength of cold-worked pure aluminium was not affected by the annealing, that of the AMK alloy increased from 8.3 kg/mm^2 after rolling, to 11 kg/mm^2 after annealing at 550 °C, the corresponding figures for the Al-20% Sn alloy being 7 and 5 kg/mm^2; 2) the shear strength of the bond in bimetal specimens after any given treatment corresponded to the strength of the weaker component given similar treatment; the AMK/Al-20% Sn bimetal strip prepared without surface-tinning treatment was an exception, its strength falling rapidly with increasing annealing temperature (8.4 kg/mm^2 after rolling, 2.8 kg/mm^2 after annealing at 550 °C); 3) the bond strength of the bimetal specimens was not
Card 2/3

affected by the degree of reduction in the first rolling operation. In the second series of experiments bimetal strips, consisting of mild steel on the one hand and AMK, Moren-400, aluminium and ASS-6-5 on the other, were studied (it was not possible to fabricate steel/Al-20% Sn bimetal strip under the conditions employed). In this case, the sandwich comprised metal strips of uniform thickness, pressure-welding being attained by cold-rolling each sandwich to 36% reduction. The shear strength of each combination was measured after rolling and after annealing at 350, 450, 500, 520, 540, 560, 600 and 620-640 °C. The following results were obtained: immediately after rolling the shear strength of the bond was similar to that of the appropriate Al-base alloy; all the bimetal specimens could be annealed at temperatures up to 450 °C without affecting the strength of the bond; the shear strength of the steel/ASS-6-5 bimetal decreased to nil after annealing at temperatures higher than 500 °C, the corresponding critical annealing temperatures for other bimetals being 560 for steel/Al, 600 °C for steel/Moren-400 and 620-640 °C for steel/AMK. There are 2 tables and 1 figure.
Card 3/3